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2020 Update of the Quality indicators for acute myocardial infarction: A position paper of the Association for Acute Cardiovascular Care.

The Study Group for Quality Indicators from the ACVC and the NSTE-ACS guideline group.

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Abstract

Background: Quality indicators (QIs) are tools to improve the delivery of evidence-base medicine. In 2017, the European Society of Cardiology (ESC) Association for Acute Cardiovascular Care (ACVC) developed a set of QIs for acute myocardial infarction (AMI), which have been evaluated at national and international levels and across different populations. However, an update of these QIs is needed in light of the accumulated experience and the changes in the supporting evidence.

Scope: The ESC methodology for the QI development was used to update the 2017 ACVC QIs. We identified key domains of AMI care, conducted a literature review, developed a list of candidate QIs, and used a modified Delphi method to select the final set of indicators.

Indicators: The same seven domains of AMI care identified by the 2017 Study Group were retained for this update. For each domain, main and secondary QIs were developed reflecting the essential and complementary aspects of care, respectively. Overall, 26 QIs were proposed in this document, compared to 20 in the 2017 set. New QIs were proposed in this document (e.g., the center use of high-sensitivity troponin), some were retained or modified (e.g., the in-hospital risk assessment), and others were retired in accordance with the changes in evidence (e.g., the proportion of patients with NSTEMI treated with fondaparinux) and the feasibility assessments (e.g. the proportion of patients with NSTEMI whom risk assessment is performed using the GRACE and CRUSADE risk scores).

Conclusion: Updated QIs for the management of AMI were developed according to contemporary knowledge and accumulated experience. These QIs may be applied to evaluate and improve the quality of AMI care.

Keywords: Quality indicators, quality improvement, myocardial infarction

Background

Assessing the quality of care has become mandatory in many healthcare systems and is an intrinsic component of quality improvement. In 2017, the European Society of Cardiology (ESC) Association for Acute Cardiovascular Care (ACVC) published a position paper defining quality indicators (QIs) for acute myocardial infarction (AMI) [1] with the aim of supporting quality improvement, and based on the assumption that rigorous measurement is fundamental. This was the first QI initiative undertaken within the ESC by one of its constituent associations, concordant with the mission statement of the ACVC to "improve the quality of care of patients with acute cardiovascular disease". The ACVC Study Group on QIs (Supplementary Table 1) decided that QIs should not only reflect high-grade recommendations in ESC guidelines, but should consider the domains of care for which there is potential room for improvement, and where measurement can be performed using existing registries or databases. As a result, the ACVC QIs covered 7 domains of care, including centre organisation, reperfusion/invasive strategies, risk assessment, antithrombotic selection, secondary prevention, and patient experience. Lastly, 2 composite indicators and one outcome were defined.

Objectives

The 2017 ESC ACVC QIs were used to support quality assessment and improvement at national [2-7] and international levels [8], and across different populations [9]. Various studies evaluating the ESC ACVC QIs using existing registries, have shown that most QIs can be captured, and, thus can guide the development of future cardiovascular registries [10]. In addition, the ESC ACVC QIs identified gaps in care delivery within and between countries, highlighting missed opportunities to improve clinical outcomes [2, 3, 5, 9].

Three years after the publication of the initial set of QIs, the ACVC study group on QI considered that an update was timely, because the ESC has updated its Clinical Practice Guidelines for the management of patients with AMI (with and without ST-segment elevation), and published the methodology by which the ESC QIs should be developed [11]. Hence, the QI update was driven by the experience accumulated from assessment of previous QIs in existing registries (Online Supplement, Table S1), the ESC methodology for QI development [11] as well as other methodologies [12, 13], and to ensure the validity of the measurements [14].

Methods

The 2017 ESC ACVC QIs were updated using the RAND/University of California–Los Angeles (UCLA) appropriateness method [15, 16], which is recommended by the ESC methodology for QI development [11], and combines best scientific evidence with the collective judgment of experts using the modified Delphi process [17].

The 2020 ESC ACVC QIs for AMI

The 7 domains of AMI care identified by the 2017 Study Group were retained. The list of the main and secondary QIs for each domain are presented in Figure 1 and Table S2 (online Supplement), with the definitions of numerators and denominators, and the corresponding ESC guidelines recommendations.

Domain 1 : Centre organisation

- ***Network organisation***

Clinical relevance: In the setting of acute coronary syndrome (ACS), a network organisation has a beneficial impact through the availability of different capacities, such as the use of a single telephone emergency number, early identification of ACS, transportation with

ambulances with basic or advanced life support capability, direct access to catheterization laboratory and delivery of care following written protocols [18]. This organisation facilitates the selection of the appropriate reperfusion strategy, and reduces times to reperfusion in ST-segment elevation myocardial infarction (STEMI) patients [19-21]. Furthermore, local, regional or national written protocols can help to reduce delays, reduce variations in the quality of care [22] and improve the quality of secondary prevention in post-discharge settings [23].

Specific aspects for selection: Two QIs are related to participation in a regional network: the main QI (1) as a measure of network organisation for the management of ACS, including written protocols; and the assessment of essential components of effective systems of STEMI care [18]. Similar QIs were already included in the 2017 ACVC QI list, are supported by class IC recommendations and also feature in the list of QIs in the 2017 STEMI [24] and 2020 non-ST segment elevation ACS (NSTE-ACS) ESC guidelines [25].

- ***Availability of high sensitivity troponin assay***

Clinical relevance: Cardiac troponin (cTn) elevation is a key diagnostic and prognostic feature in NSTE-ACS. Only 'high sensitivity' cardiac troponin (hs-cTn) assays have imprecision of <10% at the 99th percentile of the upper reference limit, and have the ability to quantify cTn levels in >50% of apparently healthy individuals. Data have shown that more sensitive cardiac troponin assays such as hs-troponin assay increase diagnostic accuracy with greater and more rapid ability to "rule-in" or "rule-out" myocardial infarction [26].

Specific aspects for selection: Main QI (2) relates to the availability of hs-cTn assay measured at centre level. The use of hs-cTn over less sensitive assays is recommended by guidelines [25]. This QI is also included in the QIs list of the 2020 ESC Guidelines for NSTE-ACS [25].

- ***Pre-hospital interpretation of ECG***

Clinical relevance: Timely diagnosis for patients with STEMI is determinant for clinical outcomes. The ESC guidelines for STEMI recommend acquiring and interpreting a 12-lead ECG as soon as possible following first medical contact (FMC) to facilitate early diagnosis and risk stratification [23, 24].

Specific aspects for selection: Main QI (3) captures the availability of systems of care in which STEMI diagnosis can be performed in the pre-hospital settings, with the initiation of appropriate treatment pathways.

- ***Participation in a regular registry or quality assessment programme***

Clinical relevance: Participation in a registry for quality assessment improves adherence to guidelines [27]. Major improvements in hospital performance and mortality rates have been reported over short periods of time, narrowing the gap between the quality of care delivered between hospitals [28, 29] and the association between the participation in a quality programme for timely reperfusion therapy and clinical improvement has been shown [23]. In addition, the assessment of reperfusion times for STEMI patients is an important and measurable component of STEMI care.

Specific aspects for selection: The two secondary QIs cover the quality improvement programme: participation in a regular registry, and regular monitoring of times to reperfusion. These QIs were already included in the 2017 ESC STEMI guidelines [24].

Domain 2: Invasive strategy

- ***Reperfusion for STEMI patients***

Clinical relevance: Reperfusion therapy should be administered to all eligible patients presenting with STEMI. Primary percutaneous coronary intervention (PCI) is the preferred option, provided it can be performed expeditiously. Based on considerable evidence, the ESC guidelines recommend time targets for reperfusion therapy based on the strategy used and the initial healthcare facility for which STEMI patients was admitted. As such, time from STEMI diagnosis to wire crossing is recommended to be <60 minutes for patients presenting at a primary PCI hospital, whereas it should be <90 minutes for patients diagnosed either in a non-PCI hospital or in the out-of-hospital setting. For patients treated by fibrinolysis, the recommended time between STEMI diagnosis and initiation of fibrinolysis is <10 minutes [24].

Specific aspects for selection: Both reperfusion and time to reperfusion have been used as key indicators of quality in patients with STEMI in most sets of QIs or performance measures (PMs) [1, 30, 31]. Main QI (1) assesses the proportion of patients with STEMI admitted within 12 hours of the onset of symptoms and treated with reperfusion (irrespective of the timing). Main QI (2) assesses "timely" reperfusion, defined for reperfusion strategy, by primary PCI or fibrinolysis [32]. The time targets correspond to those recommended by the ESC Guidelines [24]. From a practical viewpoint, the measure of the proportion of patients with STEMI reperfused among those eligible has been measured in all publications reporting ESC-ACVC QIs assessment and ranged from 57% to 98%.

- ***Early invasive strategy in NSTEMI patients***

Clinical relevance: Patients with non-ST segment elevation myocardial infarction (NSTEMI) are on the spectrum of high-risk NSTE-ACS and, therefore, eligible for an invasive approach. The benefit of a routine over a selective invasive approach has been shown in high-risk patients and the timing of the strategy is split into immediate (for patients with very high risk

features such as persistent chest pain), early (<24 hours after admission for patients with high risk features, including those with diagnosis of NSTEMI) or <72 hours.

Specific aspects for selection: Main QI (3) measures the use of an early invasive strategy and is therefore suitable for use in patients with NSTEMI. Compared with the previous QI list, the timing has been set at <24 hours (instead of <72 hours), in line with the ESC Guidelines [25, 33].

The use of radial access

Clinical relevance: The use of radial access is a new QI in this domain. It is justified by the reduction in bleeding and vascular complications achieved with the radial approach [34, 35], especially in ACS [36].

Specific aspects for selection: This new QI is likely to be easy to assess and will be applicable in the majority of patients, both STEMI and NSTE-ACS. Supported by ESC Guidelines, the 'radial-first strategy' has been referred to as 'best practice' in a position paper from the American Heart Association (AHA) [37].

Domain 3: In-hospital risk assessment

- ***Assessment of left ventricular ejection fraction***

Clinical relevance: Left ventricular ejection fraction (LVEF) assessment is important for both prognostic and therapeutic reasons.

Specific aspects for selection: This QI was already in the previous ESC ACVC QIs set.

- ***Assessment of LDL-cholesterol***

Clinical relevance: LDL-cholesterol (LDL-c) is considered a causal factor for atherosclerosis [38]. Early and intense reduction of LDL-c as soon as possible after admission has been shown to be effective. The utility of LDL-c assessment is therefore not for the prescription of statins, but rather to have an initial reference value (called 'baseline', i.e. without the effect of LDL-C lowering therapy) and to estimate the potential likelihood of reaching the 2019 ESC guidelines target [39], with a view to using additional therapies such as the combination with ezetimibe [40] or the early (within 4-6 weeks after discharge) introduction of a proprotein convertase subtilisin–kexin type 9 (PCSK9) inhibitor [39].

Specific aspects for selection: This QI is new and applicable in all patients.

- ***Risk assessment using a validated score***

Clinical relevance: Patient stratification using validated scores is important, both for ischemic and haemorrhagic risks. Thus, the use of a validated risk score is recommended by the ESC Guidelines (Class IA) for prognosis.

Specific aspects for selection: In the 2017 ESC ACVC QIs, two specific validated scores were included as independent QIs (i.e. the GRACE risk score for ischemic risk, and the CRUSADE score for haemorrhagic risk). The Study Group decided to retire the specification of the tool used, but to keep the recommendation to perform risk assessment using a validated method.

Domain 4: Antithrombotic treatment during hospitalization

- ***Proportion of patients with "adequate $P2Y_{12}$ inhibition"***

Clinical relevance: In patients with AMI, dual antiplatelet therapy (DAPT) is recommended as soon as possible when ACS is suspected. Among patients eligible for DAPT, the choice between clopidogrel, prasugrel and ticagrelor is mainly driven by the results of randomized studies comparing clopidogrel to prasugrel [41, 42] and to ticagrelor [43, 44], and the bleeding risk. 'Adequate $P2Y_{12}$ inhibition' is defined as the appropriate selection of the $P2Y_{12}$ inhibitor in accordance with the 2020 ESC Guidelines:

- the use of ticagrelor in patients without a contraindication (e.g. previous haemorrhagic stroke, high bleeding risk, treatment with fibrinolysis, or concomitant use of oral anticoagulation).

- the use of prasugrel in PCI-treated AMI patients without previous haemorrhagic or ischaemic stroke, high bleeding risk (patients ⩾75 years of age and/or with body weight < 60 kg), fibrinolysis or oral anticoagulation

- the use of clopidogrel when there is no indication for prasugrel or ticagrelor.

Specific aspects for selection: Given the importance of selecting the most appropriate $P2Y_{12}$ inhibitor in patients with coronary artery disease (i.e. tailored to the patient's ischaemic and bleeding risks), a Task Force of the ESC and European Association for Cardio-Thoracic Surgery published a focused update on DAPT [45], in line with the STEMI and NSTE-ACS Guidelines, all supporting the concept of 'adequate $P2Y_{12}$ inhibition'. This QI already featured in the previous ACVC QIs set, and is included in the list of QIs of the 2020 ESC Guidelines for NSTE-ACS. Experience with the assessment of the ACVC QIs shows that this QI may be measured from many, but not all, existing registries, depending on the quality of the variables recorded (Table S1, online Supplement).

- ***Parenteral anticoagulant at (or before) admission***

Clinical relevance: Parenteral anticoagulation is recommended in AMI from the time of diagnosis up to PCI unless otherwise indicated. Different anticoagulant agents (unfractionated heparin, enoxaparin, fondaparinux or bivalirudin) may be used in this setting. Parenteral anticoagulation is recommended for all patients, in addition to antiplatelet therapy, at the time of diagnosis,.

Specific aspects for selection: This QI replaces the previous QI relating to fondaparinux because the ESC Guidelines no longer express a strong preference for any particular drug.

- ***Patients discharged on dual antiplatelet therapy***

Clinical relevance: The need for DAPT is a cornerstone of AMI management at the time of hospital admission and discharge, unless the patient is deemed to be at high bleeding risk [45].

Specific aspects for selection: This QI is a complement to main QI (1), with the particular interest of being more straightforward, easier to assess, and including the prescription of aspirin. Contrary to 'adequate $P2Y_{12}$ inhibition', this QI is reported in all published assessments. Notably, patients treated with oral anticoagulation are excluded because several alternative strategies are available, including some without aspirin.

- ***Mention the duration of dual antiplatelet therapy in the discharge letter***

Clinical relevance: Although the standard duration of DAPT after AMI is 12 months, it must be determined according to the patient's risk and ischemic profile, and may range from 1 to 48 months [45]. At discharge, a shortening or prolongation of the DAPT duration may be proposed according to specific tools, depending on the patient's characteristics, coronary anatomy, the extent of coronary artery disease, or PCI procedure.

Specific aspects for selection: Poor quality discharge letters represent a deficit in communication between hospital specialists and primary care physicians [46]. The post AMI discharge document is a crucial element to ensuring transmission of medical information to the corresponding physician or the patient, including the ischemic and haemorragic risk as perceived during the acute hospitalisation. Standardization of the discharge document, including insights about the type and duration of the anti-thrombotic treatment has been highlighted by the recent ESC guidelines [25] and its routine application has been accepted by a national group in France [47].

Domain 5: Secondary prevention discharge treatments

After AMI, patients remain at very high risk and secondary prevention treatment is crucial for reducing mortality and further cardiovascular events. The QIs in this domain cover the prescription of 3 therapeutic classes, in addition to the anti-thrombotic treatment.

- ***High-intensity statins***

Clinical relevance: Statins are fundamental to the treatment of atherosclerosis. In the setting of AMI, high intensity statins are safe and provide better prevention as compared to moderate intensity [48], irrespective of admission LDL-c. Despite the body of evidence regarding the beneficial effects of lowering LDL-c [38] by statins (alone or in combination with ezetimibe or PCSK9 inhibitors), their use in current registries remains sub-optimal and the proportion of patients at LDL-c target is low: 32% in men and 23% in women in the EuroAspire V registry [49].

Specific aspects for the selection: This QI was already in the 2017 ESC-ACVC list. Experience of assessment suggests that this QI cannot be assessed from some registries,

because the type and dose of statins prescribed at discharge were not recorded. In addition, it is likely that intolerance to high-intensity statins was also not recorded. In registries reporting this QI, the rate of prescription of statins (any intensity) is high, but at high-intensity in only about half of the patients [49].

- ***Patients with LVEF <40% who are discharged from hospital on angiotensin-converting enzyme inhibitors (or angiotensin receptor antagonists if intolerant of ACEI)***

Clinical relevance: Angiotensin-converting enzyme inhibitors (ACEI) improve survival in patients with impaired LV systolic function, defined by an LVEF <40%. Initiation of ACEI (or angiotensin receptor antagonists [ARBs] in patients intolerant to ACEI) and prescription at the time of hospital discharge is beneficial among patients with a LVEF <40%.

Specific aspects for the selection: This QI was already in the 2017 ESC ACVC list, supported by a Class IIA recommendation. In practice, the proportion of patients with LVEF <40% is 15-20% in current registries; therefore, the QI applies only to a subset of high-risk patients.

- ***Patients with LVEF <40% who are discharged from hospital on beta-blockers***

Clinical relevance: Beta-blockers remain a standard of care following AMI, however the evidence was based on studies performed before the era of reperfusion [50]. In a recent large-scale observational study, a benefit with beta-blockade in post-AMI patients was shown, but only among patients with LV dysfunction [51].

Specific aspects for the selection: This QI was already in the 2017 ESC-ACVC list. The exact type of beta-blocker indicated for patients with LV systolic dysfunction was not specified for the QI, given the complexity of the measure.

Domain 6: Patient satisfaction

- ***Feedback regarding the patient's experience and systematic assessment of health-related quality of life***

Clinical relevance: The concept of "patient-centered care" is based on focusing care on the patient rather than on the disease. In this approach, patients are actively involved in their own care, congruent with the principle of shared-decision making. Patient-Reported Outcomes (PRO, which can be seen as an assessment of the perceived level of impairment, disability and quality of life) and Patient-Reported Experience (PRE, which gather information on the care) [52] can be considered as QIs. To this end, PRO and PRE can be measured through patient satisfaction questionnaires [53]. In the setting of AMI, patient satisfaction PRO and PRE are associated with other indices of quality of care [54, 55].

Specific aspects for selection: This QI was already included in the 2017 ESC-ACVC QI list, but only partial assessment has been reported, except for 'referral to rehabilitation programmes' and 'pain control'. The use of a health-related quality of life questionnaire at discharge is reported in the long-tErm follow-up of antithrombotic management patterns In acute CORonary syndrome patients (EPICOR) and the Evaluation of the Methods and Management of Acute Coronary Events (EMMACE)-3 and -4 registries [8]. The Study Group has defined the main QI as a 4-item composite indicator including referral to a rehabilitation programme, patient information about the disease, treatment and pain control. The secondary

QI is the assessment of the health-related quality of life in all patients using a validated instrument.

- ***Discharge letter sent to the patient***

Clinical relevance: Copying the hospital discharge letter to the patient is an essential part of communication. The UK Academy of Medical Royal Colleges has published guidance on this topic, considering that excellent written communication is essential to good quality of care and that the letter would be better addressed to the patient and not to the corresponding physician ("Write to, not about") [56]. This practice of writing to the patient, compared with writing to the clinician, increases patient satisfaction, improves both the doctor-patient relationship and trust, and reduces anxiety [57].

Specific aspects for selection: To date, no similar QI or PM has been defined, but it appears to be feasible even if this currently remains undetermined.

Domain 7: Outcome and Composite QI

- **Outcomes QI:** 30-day mortality rate adjusted for a validated risk score is unchanged.

Clinical relevance: All-cause mortality is a self-evident assessment of quality of care and the most easily interpretable, objective and unambiguous indicator. While the accuracy of mortality as a direct measure of quality of care is controversial [58], the association between the ESC ACVC composite QI and the risk-adjusted outcomes is important.

Specific aspects for the selection: All-cause mortality is easy to assess and this measure provides essential information at broad-level (i.e. region-, country- or continent-levels). At

centre-level, the interpretation may be more challenging and less generalizable, depending on the size of the denominator.

- **Composite QI:**

Composite quality indicators (CQI) summarize information from different domains into a single measure. Thus, it is possible to expand the scope of the measure by including a broad range of individual indicators, to provide a single metric that enables temporal comparisons, classification of centres and demonstration of the association between the CQI and outcomes, a way of reassuring clinicians about the validity of process instead of clinical outcome assessment [13].

Clinical relevance: By reducing the information from all domains into a single CQI, the areas for specific improvement may be obscured. Among the different types of composites, the opportunity-based and the all-or-none are the most frequently recommended for the quality of care assessment [59, 60]. Since the two methods, while associated [61], provide different approaches, both types of CQI have been maintained in the updated version. The main CQI is an opportunity-based score, where all domains are represented and have the same weight (except in patients with LVEF <40% in whom two additional items are required, giving more weight to the secondary prevention domain). This design has the advantage of increasing the number of items, which may vary according to the patient characteristics and the database used. The secondary CQI has an all-or-none design with only three individual QIs, but all three are deemed clinically relevant: the timely reperfusion or invasive strategy, the prescription of the "appropriate" $P2Y_{12}$ inhibition and high-intensity statins. With this CQI, only patients who received all three processes are considered as a success and therefore, this method best reflects the patient's interest and tracks excellence.

Specific aspects for the selection: In the previous experience of assessment of the 2017 ESC ACVC QIs, the opportunity-based CQI was reported in most cases and, after transformation into categories, was associated with mortality [2, 3, 5, 7, 8]. The Study Group decided that the opportunity-based CQI should contain one item per domain, namely the most adequate to capture quality, despite the challenges for assessment, and considering that this was more an issue related to the design of current registries than the definition of the CQI.

Comparison with previous Quality Metrics definitions and future developments

The comparison of QI selection between the ESC ACVC 2020 and ESC-ACCA 2017, the American College of Cardiology (ACC) and AHA 2017 and Canadian Cardiovascular Society (CCS) 2007 is presented in Table 1.

- *Centre organisation*: compared to the 2017 selection, the QI on availability of hs-cTn in the centre is new.

- *Reperfusion/invasive strategy*: the number of QIs has been reduced and the indicators related to the time for reperfusion have been aligned with the 2017 ESC GL and simplified as compared to the 2017 definition. As compared to the ACC/AHA measure set, the starting time is the initial diagnosis of STEMI (versus first medical contact for ACC/AHA) and the thresholds are different: <60 min to wire crossing the lesion for patients presenting at a primary PCI hospital, or <90 min for patients diagnosed either in a non-PCI hospital or in the out-of-hospital setting who were then transferred to a PCI-capable centre, and < 10min in case of reperfusion with fibrinolysis. The radial access QI

is new, and has not been presented in other selections. The reduction of the time to invasive approach to 24h in NSTEMI is in line with comparable PM from the ACC/AHA.

- *Risk assessment*: The main change is the simplification of the overall risk assessment, without specifying specific risk scores. The assessment of LDL-c has been added as a Main QI. The ESC Guidelines recommend this measure because available evidence supports the addition of ezetimibe and PCSK9 inhibitors on top of high-intensity statins in selected patients.

- *Antithrombotic treatment during hospitalization*: the prescription of "adequate $P2Y_{12}$ inhibition", already in the 2017 list, has been confirmed, despite the complexity of the assessment. The selection of an "adequate" $P2Y_{12}$ inhibitor is also in the ACC/AHA PM list with two different definitions, both focusing on the safety side, without considering the potential benefit of using a more potent $P2Y_{12}$ inhibitor in eligible patients. The use of fondaparinux (for NSTE-ACS in the ACVC 2017 selection) has been replaced by the use of a parenteral agent at admission. The mention of the duration of DAPT in the discharge letter is a new indicator, never seen in previous selections. As in 2017, aspirin at admission and at discharge are not included in the list of QIs, reflecting the fact that although this treatment is of paramount importance, the Study Group considers it to be widely applied, with limited room for improvement [30].

- *Secondary Prevention:* There has been no change to this section, compared to the 2017 selection. The prescription of high-intensity statins at discharge was also adopted by ACC/AHA, while aspirin at discharge (and at admission) is considered to be "topped out" and not included in the ESC ACVC list.

- *Patient satisfaction:* With the exception of cardiac rehabilitation, no comparable indicators have been defined by the ACC/AHA or CCS. The Study Group consider these

QI to be important, and there is a compelling need to include the necessary variables in future registries to render assessment possible.

- *Mortality:* Risk-adjusted 30-day all-cause mortality has been maintained in the updated QI list, despite significant limitations for interpretation. In contrast, no outcome measure has been selected by ACC/AHA, because the outcomes are only partially dependent on the quality of care, risk adjustment is challenging and, used as PM and not a QI, inclusion of outcome measures could have potentially negative consequences [12].

Perspectives

The first set of QIs was developed to improve quality through self-assessment. This has been possible in different countries, not carried out by health agencies or insurance companies, but by cardiologists themselves at low cost through existing registries. To facilitate such use of QIs, the Study Group considered the results of these assessments in revising the QIs. Thus, some QIs that were found to be challenging to report have been retired or modified. Conversely, despite not being measured in all registries, certain QIs have been maintained, considering that they capture important aspects of quality care. The next step will be the standardization of the main registries in Europe in order to include the specific variables needed for quality assessment according to the revised set of QIs. In most existing registries and surveys, this would correspond to the addition of a limited number of variables, which should be reliable and straightforward to assess.

Figure Legend

Figure 1: Main and secondary Quality Indicators for each domain. Timely reperfusion is defined as time from STEMI diagnosis to (1) infarct-related artery wire crossing : <60 min for patients presenting at a primary PCI hospital, or (2) <90 min for patients diagnosed either in a non-PCI hospital or in the out-of-hospital setting, or (3) injection of the bolus of fibrinolysis < 10min for patients reperfused with fibrinolysis.

Appendix

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Table 1: **Quality metrics selected by ESC-ACVC 2020, ESC ACCA 2017, 2020, ACC/AHA 2017, and CCS 2007.**

In bold, the Main QIs in 2020. Green cases for quality metric with comparable definition as ESC ACVC 2020; in orange quality metric selected items with a different definition, in white, no corresponding quality metric. In red, withdrawn indicators

Domain	**Indicators**	**ACVC 2020**	**ACCA 2017**	**ACC/ AHA 2017**	**CCS 2008**
Centre Organisation	**Network**				
	Availability of hs-cTn				
	Pre-hospital interpretation of ECG				
	Quality registry programme				
	Systematic assessment of times to reperfusion				
Reperfusion – invasive coronary strategy	**STEMI with reperfusion**				
	Timely reperfusion by PCI				
	Time for fibrinolytic therapy				
	Door to needle time				
	Door in Door out time				
	Time to PCI transferred patient				
	Invasive strategy <24h				
	Radial access				
	FMC to arterial access (STEMI)				

Risk assessment	**LVEF assessment**				
	LDL-c assessment				
	Risk assessment with a validated score				
Antithrombotics	**Adequate $P2Y_{12}$**				
	Aspirin admission				
	Parenteral anticoagulation				
	DAPT at discharge				
	Mention about DAPT duration				
Secondary Prevention	**High-intensity statins**				
	Aspirin discharge				
	ACEI/ARB if LVEF<40%				
	Aldosterone antagonist at discharge				
	Beta-blockers if LVEF<40%				
Patient satisfaction	**Feedback**				
	Cardiac rehabilitation				
	Smoking cessation advice				
	Quality of life				
	Discharge letter				
Cardiac arrest	Immediate angiography				
	Hypothermia				
Composite Indicator	**Opportunity-based**				
	All or none				
Outcomes	**30-day risk-adjusted mortality**				

Figure 1


(M1) Opportunity-based composite QI
(S1) All-or-none composite QI
(M2) Risk adjusted 30-day mortality rate
(M1) Written protocols for network
(M2) Hospital use of hs-cTn
(M3) Prehospital interpretation of ECG
(S1) Participation in regular registry
(S2) Assessment of times to reperfusion
(M1) Systematic data collection on patient's experience
(S1) Systematic evaluation of quality of life
(S2) Discharge letter sent to patient
(7) Composite indicators & mortality
(6) Patient's satisfaction
Outcomes
(1) Centre organization
Patient's satisfaction
Structure
Quality Indicators
ACVC
(M1) % pts with high-intensity statins at discharge
(S1) % pts with LVEF<40% on ACEI (or ARB)
(S2) % pts with LVEF<40% on beta blockers
(5) Secondary prevention
(2) Reperfusion & invasive strategy
Process
(M1) % STEMI pts reperfused
(M2) % STEMI pts timely reperfused
(M3) % NSTEMI pts with coronary angiography <24h
(M4) Use of radial access if invasive strategy
(S1) FMC to arterial access time
(4) Anti-thrombotic treatment
(3) In-hospital risk assessment
(M1) % pts with "adequate P2Y12 inhibition"
(M2) % pts with parenteral anticoagulant at admission
(S1) % pts discharged on DAPT
(S2) % pts with reported duration of DAPT
(M1) % of pts with LVEF assessment
(M2) % of pts with LDL-cholesterol evaluation
(S1) % of pts with risk score assessment
Composite outcomes

ONLINE SUPPLEMENT

Table S1. Assessment of the 2017 ESC ACVC QIs in different international patient registries. Rates of QIs reported by domains and by cohorts

	Registry feature	FAST-MI 2010	EPICOR 2010-2012	MINAP 2012-2013	ACSIS 2013	EPIHeart 2013-2014	ProACS 2014-2016	NH SRI-LANKA 2017-2018	PL-ACS 2018
Demographics	Country	France	28 countries	United Kingdom	Israel	Portugal	Portugal	Sri Lanka	Poland
	No. of patients	4,169	18,117	118,075	1,491	711	6,222	934	8,279
	No. of STEMI (%)	2,314 (55%)	11,559 (64%)	47,341 (40%)	626 (42%)	359 (47%)	2,513 (40%)	844 (90%)	8,279 (100%)
QI 1	1.1. Centre organization (part of network)	NR	88%	78%	NR	100%	NR	NR	45%
	1.2. Assessment of time to reperfusion, STEMI	81%	90%	100%	100%	0%	NR	NR	100%
QI 2	2.1. Reperfusion for STEMI	77%	57%	89%	95%	99%	92%	22%	95%
	2.2. Timely reperfusion for STEMI	52%	26%	75%	54%	30%	33%	16%	55%
	Reperfusion with lysis	15%	NR	1%	71%	4%	5.2%	6.3%	NR
	Patients with time to coronary angiography	86%	98%	61%	54%	94%	84%	NR	N/A
	2.3. Early angiography for NSTEMI	92%	68%	NR	84%	81%	79%	30%	N/A
QI 3	3.1. GRACE risk score in notes	NR	NR	NR	NR	2%	NR	100%	N/A
	3.3. Assessment of LV function	92%	74%	55%	72%	81%	NR	NR	86%
QI 4	4.1. Adequate P2Y12 inhibition	57%	NR	87%	86%	97%	NR	79%	NR
	4.2. Fondaparinux for NSTEMI	14%	NR	50%	NR	10%	86%	NR	NR
	4.3. DAPT on discharge	87%	90%	88%	83%	93%	NR	79%	89%
QI 5	5.1. High intensity statins on discharge	49%	NR	NR	NR	58%	94%	NR	NR
	Statin on discharge	89%	91%	97%	93%	NR	97%	88%	78%
	5.2. ACE/ARB on discharge	84%	74%	95%	83%	79%	83%	NR	74%
	5.3. BB on discharge	63%	77%	96%	82%	81%	76%	NR	83%
QI 6	6.1 Data regarding patient satisfaction	NR	98%	NR	NR	NR	NR	76%	NR
	Patient rehabilitation	NR	NR	NR	NR	23%	34%	NR	54%
QI 7	7.1 Opportunity-based CQI	50%	85%	83%	86%	64%	NR	NR	NR
	7.2. All-or-none CQI (all/none)	51%	99%	85%	78%	59%	76%	NR	66%
	Survival data	98%	100%	72%	100%	94%	NR	61%	NR
	Follow-up	3 years	2 years	30 days	1 year	30 days	NR	30 days	NR

Table S2: Definition of the Main and Secondary Quality Indicators for each of the seven domains of care

Domain 1 : Centre organisation		**Assessment**	**GL Class**	**ACP Measure criteria**
Main (1)	The centre should be part of a network organisation with written protocols for rapid and efficient management	***Numerator:*** *centres participating in a network for management of STEMI and NSTEMI patients with written protocols.*	I B	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, no denominator (by center) ***Measure feasibility***: under physicians' control, usable, data collection feasible, low complexity, time dependent variable
Main (2):	Hospital use of hs-cTn.	***Numerator:*** *Availability of hs-cTn assay in the center*	IC	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, no denominator (by center) ***Measure feasibility***: under physicians' control, usable, data collection feasible, low complexity, time dependent variable
Main (3)	Pre-hospital interpretation of ECG for 1) diagnosis, 2) decision for immediate transfer to a centre with catheterisation laboratory facilities, and 3) pre-hospital activation of the catheterisation laboratory	***Numerator:*** *Availability of system for pre-hospital ECG interpretation and transfer decisions.*	IC	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, low level of evidence ***Measure specification***: measure reliable, no denominator (by center) ***Measure feasibility***: under physicians' control, usable, data collection feasible, moderate complexity, time dependent variable
Secondary (1)	The centre should participate in a regular registry or programme for quality	***Numerator:*** *Centres participating regularly in local,*	IC	***Importance***: high impact ***Appropriate care***: underuse

	assessment	*regional, national or international quality registry*		***Evidence base***: recommended, low level of evidence ***Measure specification***: measure reliable, no denominator (for the center) ***Measure feasibility***: under physicians' control, usable, data collection feasible, low complexity, time dependent variable
Secondary (2):	Routine assessment of relevant times for the reperfusion process in STEMI patients (i.e. times from 'call to first medical contact', 'first medical contact to arrival at PCI centre, arrival at PCI centre to arterial access)	***Numerator:*** *Routine monitoring of relevant reperfusion times in primary PCI programs*	I C	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, low level of evidence ***Measure specification***: uncertain reliability, no denominator (for the center) ***Measure feasibility***: under physicians' control, usable, data collection feasible, high complexity, time dependent variable

Domain 2 : Reperfusion/Invasive strategy		**Assessment**	**GL Class**	**ACP Measure criteria**
Main (1)	Proportion of patients with STEMI reperfused among those eligible (onset of symptoms to diagnosis <12 h).	***Numerator:*** *Number of eligible patients with STEMI <12 hours undergoing reperfusion* ***Denominator:*** *number of* patients with *STEMI eligible for reperfusion and without contraindications*	I A	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, numerator-denominator clearly defined ***Measure feasibility***: under physicians' control, usable, high burden of patients (STEMI), data collection feasible, low complexity, variable recorded in most current registries.
Main (2)	Proportion of patients with STEMI who receive timely reperfusion. Timely is defined	***Numerator:*** *number of patients with STEMI undergoing timely*	I A	***Importance***: high impact ***Appropriate care***: underuse

	as: *1) For patients presenting **at** primary PCI hospitals*: <60 min from initial STEMI diagnosis to infarct-related artery wire crossing *2) For patients diagnosed either in a non-PCI hospital or in the out-of-hospital setting and then transferred to a PCI-capable center:* <90 min from initial STEMI diagnosis to infarct-related artery wire crossing *3) For patients treated with **fibrinolysis**, initiation of fibrinolysis within 10 minutes after STEMI diagnosis*	*reperfusion with Primary PCI or fibrinolysis* ***Denominator:** all patients with STEMI eligible for reperfusion*		***Evidence base***: recommended, high level of evidence ***Measure specification***: uncertain reliability, numerator-denominator clearly defined ***Measure feasibility***: under physicians' control, usable, high burden of patients (STEMI), data collection feasible, low complexity, but variables not recorded in all current registries.
Main (3)	Rate of NSTEMI patients who receive invasive coronary angiography within 24h of their diagnosis	***Numerator:** number of NSTEMI patients who receive invasive coronary angiography within 24h of their diagnosis.* ***Denominator:** all NSTEMI patients without contraindications*	I A	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, numerator-denominator clearly defined ***Measure feasibility***: under physicians' control, usable, high burden of patients (NSTEMI), data collection feasible, low complexity, variable recorded in most current registries.
Main (4):	Use of radial access in case of invasive strategy	***Numerator:** number of patients who receive invasive coronary angiography via radial access.* ***Denominator:** number of patients who receive invasive coronary angiography without overriding procedural considerations against the use*	I B	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, numerator-denominator clearly defined ***Measure feasibility***: under physicians' control, usable, high burden of patients (STEMI), data

		of radial access		collection feasible, low complexity, variable recorded in most current registries.
Secondary (1)	The time between the initial STEMI diagnosis and arterial access (absolute value) for primary PCI.	***Numerator*** *median time between initial STEMI diagnosis and arterial access among STEMI patients undergoing reperfusion*	I C	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: uncertain reliability, numerator-denominator clearly defined ***Measure feasibility***: under physicians' control, usable, high burden of patients (STEMI), data collection feasible, low complexity, variable recorded in most current registries.

Domain 3 : In-hospital risk assessment		**Assessment**	**GL Class**	**ACP measure criteria**
Main (1)	The proportion of patients who have an assessment of LVEF before hospital discharge (LVEF should be assessed and the numerical value recorded for all patients).	***Numerator****: number of patients who have their LVEF measured before hospital discharge* ***Denominator:*** *Total number of patients with a diagnosis of AMI*	I C	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, low level of evidence ***Measure specification***: measure reliable, numerator-denominator clearly defined ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, low complexity, variable recorded in most current registries.
Main (2)	LDL-Cholesterol assessment should be performed during hospitalization	***Numerator:*** *number of patients who have their LDL-cholesterol measured during hospitalization.* ***Denominator:*** *Total number of patients with a diagnosis of AMI*	I C	***Importance***: meaningful clinical impact ***Appropriate care***: underuse ***Evidence base***: high level of evidence ***Measure specification***: measure reliable, numerator-denominator clearly defined ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, low complexity, variable

				recorded in most current registries.
Secondary (1)	Ischemic and haemorragic risk assessment should be performed using a validated risk score.	***Numerator:*** *number of patients who have been stratified according to a validated risk score* ***Denominator:*** *Total number of patients with a diagnosis of AMI*	IIa C	***Importance***: performance gap ***Appropriate care***: underuse ***Evidence base***: recommended, low level of evidence ***Measure specification***: measure reliable, numerator-denominator clearly defined ***Measure feasibility***: uncertain, usable, high burden of patients, data collection feasible, low complexity, but variable not recorded in all current registries.

Domain 4: Anti-thrombotic treatment during hospitalisation		Assessment	GL Class	ESC-ACCA QI 2017 definition
Main (1)	Proportion of patients with "adequate $P2Y_{12}$ inhibition" defined as: (number of patients discharged with prasugrel, ticagrelor, or clopidogrel)/(patients eligible). Eligible is defined as follows: • For ticagrelor: AMI patients without previous haemorrhagic stroke, high bleeding risk, fibrinolysis or oral anticoagulation. • For prasugrel: PCI-treated AMI patients without previous haemorrhagic or ischaemic stroke, high bleeding risk (patients ⩾75 years and/or <60 kg body weight are also considered as high bleeding risk features), fibrinolysis or oral anticoagulation. • For clopidogrel: no indication for prasugrel or ticagrelor and no high bleeding risk.	***Numerator**: Number of patients prescribed adequate P2Y12 inhibitor at the time of hospital discharge.* ***Denominator**: Number of patients discharged who have an indication for dual antiplatelet therapy*	I A .	***Importance***: high impact ***Appropriate care***: underuse and overuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, numerator-denominator complex to define ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, moderate complexity, variable recorded in most current registries.
Main (2)	Parenteral anticoagulant at admission	***Numerator:** number of patients treated with one parenteral anticoagulant until coronary revascularisation* ***Denominator:** All patients not treated with VKA*	I A	***Importance***: high impact ***Appropriate care***: underuse and overuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, numerator-denominator easy to define ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, low complexity, variable

				recorded in most current registries.
Secondary (1)	Patients discharged on dual antiplatelet therapy	***Numerator:*** *number of patients prescribed dual antiplatelet therapy at the time of hospital discharge.* ***Denominator:*** *patients alive at the time of hospital discharge who have an indication for dual antiplatelet therapy with no contraindications.*	I A .	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, numerator-denominator easy to define (contra-indications not recorded in all registries). ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, moderate complexity, variable recorded in most current registries.
Secondary (2)	Mention the duration of the dual antiplatelet therapy in the discharge letter	***Numerator :*** *number of patients for whom the duration of the dual antiplatelet therapy is specified in the discharge document* ***Denominator:*** *number of patients prescribed dual antiplatelet therapy at the time of hospital discharge*	No	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: no recommendation, low level of evidence. ***Measure specification***: measure reliable, numerator-denominator complex to define ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, low complexity, but variable not recorded in current registries.

Domain 5 : Secondary prevention discharge treatments		Assessment	GL Class	**ACP Measure criteria**
Main	Proportion of patients discharged from hospital on high intensity statins (defined as atorvastatin ⩾40 mg or rosuvastatin ⩾20 mg) unless contraindicated	***Numerator:*** *number of patients who receive high intensity statin therapy at the time of hospital discharge.* ***Denominator:*** *number of*	I A	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable,

		patients alive at the time of hospital discharge and without contraindications, refusal, side effects or history of intolerance to high-intensity statin therapy.		numerator-denominator complex to define (intolerance not recorded in all registries) ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, moderate complexity, but variable not recorded in most current registries.
Secondary (1)	Proportion of patients with LVEF <40% who are discharged from hospital on ACEI (or ARBs if intolerant of ACEI).	***Numerator:*** *number of patients with a LVEF <40%, prescribed ACEI/ARB at the time of hospital discharge.* ***Denominator:*** *number of patients with LVEF <40% and alive at the time of hospital discharge who are eligible for ACEI/ARBs (no severe renal impairment, hyperkalaemia, other contra-indication, refusal, side effects, or allergy).*	I A	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, numerator-denominator easy to define (contra-indication not recorded in all registries) ***Measure feasibility***: under physicians' control, usable, low burden of patients, data collection feasible, moderate complexity, variable recorded in most current registries.
Secondary (2)	Proportion of patients with LVEF <40% who are discharged from hospital on beta-blockers	***Numerator:*** *number of patients with LVEF <40%, prescribed beta-blockers at the time of hospital discharge.* ***Denominator:*** *number of patients with LVEF <40%, and alive at the time of hospital discharge who are eligible for beta-blockers.*	I A	***Importance***: high impact ***Appropriate care***: underuse ***Evidence base***: recommended, high level of evidence ***Measure specification***: measure reliable, numerator-denominator easy to define (contra-indication not recorded in all registries) ***Measure feasibility***: under physicians' control, usable, low burden of patients, data collection feasible, moderate complexity, variable recorded in most current registries.

Domain 6 : Patient satisfaction		Assessment	GL Class	**ACP Measure criteria**
Main	Feedback regarding the patient's experience systematically collected in an organized way from all patients. It should include the following points: (1) Recommendation to attend an educational program (rehabilitation, smoking cessation, weight control and diet counselling). (2) Explanations provided by doctors and nurses (about the coronary disease, the benefit/risk of the discharge treatment, and medical follow-up). (3) Discharge information regarding what to do in case of recurrence of symptoms and timing of visit. (4) Pain control.	***Numerator:*** *number of patients alive at the time of discharge from hospital from whom feedback is collected* ***Denominator:*** *number of patients discharged from hospital alive*	No	***Importance***: performance gap ***Appropriate care***: underuse ***Evidence base***: not recommended, low level of evidence ***Measure specification***: measure complex, numerator-denominator easy to defined ***Measure feasibility***: out of physicians' control, usable, high burden of patients, data collection feasible, high complexity, but variable not recorded in current registries.
Secondary (1)	Systematic assessment of health-related quality of life in all patients using a validated instrument.	***Numerator:*** *number of patients with MI alive at the time of hospital discharge who have their health-related quality of life assessed during hospitalization using a validated instrument* ***Denominator:*** *number of patients with MI discharged from hospital*	No	***Importance***: performance gap ***Appropriate care***: underuse ***Evidence base***: not recommended, low level of evidence ***Measure specification***: measure complex, numerator-denominator easy to defined ***Measure feasibility***: out of physicians' control, usable, high burden of patients, data collection feasible, low complexity but variable not recorded in current registries.

Secondary(2)	The discharge letter should be sent to the patient	***Numerator:*** *number of patients with MI discharged alive who were the recipient of the discharge letter* ***Denominator:*** *number of patients with MI discharged from hospital*	No	***Importance***: performance gap ***Appropriate care***: underuse ***Evidence base***: not recommended, low level of evidence ***Measure specification***: feasible, numerator-denominator easy to defined ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, low complexity but variable not recorded in current registries.

Domain 7: COMPOSITE INDICATORS and OUTCOMES

Composite QI (CQI)		Assessment	GL Class	**ACP Measure criteria**
Main: Opportunity based CQI	Opportunity based composite QI (all indicators are weighted equally) based on: ***Calculated on 6 individual QIs in patients with LVEF≥40%:*** 1) The centre should participate in a regular registry or program for quality assessment. 2)-STEMI): proportion of patients with STEMI reperfused among those eligible (onset of symptoms to initial diagnosis <12 h). 2)-NSTEMI): proportion of patients with NSTEMI who receive invasive coronary angiography within 24h of their initial diagnosis. 3) Assessment of LVEF before hospital discharge. 4) Discharge on adequate $P2Y_{12}$ inhibition.	***Numerator:*** *all patients with MI discharged from hospital alive: sum of points (one point for each individual indicator).* ***Denominator:*** *all patients with MI discharged from hospital alive: sum of points (one point for each applicable indicator, according to patient and centre characteristics)*	No	***Importance***: meaningful clinical impact ***Appropriate care***: underuse ***Evidence base***: high level of evidence ***Measure specification***: feasible, numerator-denominator easy to defined ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, high complexity but variables recorded in most current registries.

	5) Discharge on high-intensity statins. 6) Feedback regarding the patient's experience systematically collected ***Additional items in patients with clinical evidence of heart failure or LVEF<40%.*** 7) LVEF <40%: discharged on ACEI/ARB. 8) LVEF <40%: discharged on beta-blockers			

Composite QI (CQI)		Assessment	GL Class	ESC-ACCA QI 2017 definition
Secondary: All-or-none	All or None composite QI based on 3 or 5 components, 1-STEMI: Patients with STEMI who receive timely reperfusion, among those eligible 1- NSTEMI: Patients with NSTEMI with invasive coronary angiography within 24h of their initial diagnosis 2) Discharge on adequate $P2Y_{12}$ inhibition 3) Discharged on high-intensity statins. Additional items in patients with clinical evidence of heart failure or LVEF<40%. 4) Discharge on beta-blockers. 5) Discharge on ACEI or ARB.	***Numerator:*** *all patients with MI discharged from hospital alive: sum of points (one point for each individual indicator).* ***Denominator:*** *all patients with MI discharged from hospital alive: sum of points (one point for each applicable indicator, according to patient and centre characteristics)*		***Importance***: meaningful clinical impact ***Appropriate care***: underuse ***Evidence base***: high level of evidence ***Measure specification***: feasible, numerator-denominator easy to defined ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible high complexity, variables recorded in most current registries.

Outcome QI		Definition	GL Class	**ACP Measure criteria**
Main	Risk adjusted 30-day mortality rate	***Numerator*** *all patients with MI who died within the first 30 days after admission* ***Denominator*** *all patients with a diagnosis of AMI*	No	***Importance***: meaningful clinical impact ***Appropriate care***: underuse ***Evidence base***: high level of evidence ***Measure specification***: feasible, numerator-denominator easy to defined ***Measure feasibility***: under physicians' control, usable, high burden of patients, data collection feasible, low complexity, variable recorded in most current registries.

ACP Measure criteria: criteria to assess the validity of performance measures as defined by the American College of Physicians. *STEMI= ST segment elevation acute myocardial infarction; NSTEMI=Non-ST elevation acute myocardial infarction; GL=guidelines; NSTEMI=Non-ST elevation myocardial infarction; IQR=interquartile range; LVEF=left ventricular ejection fraction; LDL=low-density lipoprotein; DAPT=dual antiplatelet therapy; ACEI=angiotensin-converting-enzyme inhibitors; ARB=angiotensin-receptor blockers; CCS=chronic coronary syndrome; CKD= chronic kidney disease; CQI=composite quality indicator*